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THE NON-MARINE MOLLUSKS OF QUINTANA ROO, MEXICO WITH THE DESCRIPTION OF A NEW SPECIES OF *DRYMAEUS* (PULMONATA: BULIMULIDAE)

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The 1960 Bredin–Smithsonian Institution Expedition to the coast of the Territory of Quintana Roo, Mexico, and Grand Cayman was devoted mainly to the collection of marine organisms and insects. Land shells were, however, gathered by the author and other members of the expedition at certain places as the opportunity arose. Since there are only a few scattered published records of non-marine mollusks from Quintana Roo, I have combined these with the recently collected material in the preparation of the following account.

The only paper dealing specifically with the area is H. G. Richards' (1937) publication on the land and freshwater mollusks of Cozumel Island, in which 22 species are listed. Among the material we collected are six species not cited by Richards. In addition, seven other species are listed below which are either mentioned by Bequaert and Clench (1933, 1936) as occurring in Quintana Roo, or are represented by specimens in the collection of the U. S. National Museum, including a representative of a new species. This brings the number of species known to occur in Quintana Roo to 34, a total that will probably be increased by further explorations and collecting.

Many of the new records contained in the Division of Mollusks of the U. S. National Museum are the result of the joint efforts of E. W. Nelson and E. A. Goldman, who over the period 1892 to 1906, covered practically all of Mexico in their explorations, devoting most of their efforts to the investigations of the bird and mammal faunas. In the course of their travels, however, they gathered many mollusks, and in Quintana Roo their collecting was done in three places in the northern part of the territory—at Puerto Morelos on the mainland, and on the Isla Mujeres and Isle de Cozumel, the former lying to the north of Puerto Morelos, and the latter to the south. A description of the nature of the country and vegetation of this area is given by Goldman in his publication describing these Mexican investigations (Goldman, 1951). More recently, accounts of the geography and physiography of Quintana Roo have been given by Clinton R. Edwards (1954, 1957).

ACKNOWLEDGMENTS

To Dr. William J. Clench, Museum of Comparative Zoology, Harvard University, I am indebted for the privilege of examining certain specimens from Quintana Roo cited in the literature. Dr. R. Tucker Abbott has kindly loaned material from the collection of the Academy of Natural Sciences of Philadelphia for comparison, and from the British Museum, through the cooperation of Messrs. Norman Tebble and S. P. Dance of the Mollusca Section, Department of Zoology, I have obtained photographs of the types of certain species whose status was doubtful.

At this point I would like to express my thanks and appreciation to Mr. and Mrs. Bruce S. Bredin of Wilmington, Delaware, whose sponsorship of numerous expeditions to various parts of the world have immeasurably enriched the collections of the U. S. National Museum, and whose generosity made this trip and my presence on it possible.

COLLECTING STATIONS

Land snails were obtained at seven collecting stations, and the species gathered at these localities are enumerated below.

Sta. 32. Isla de Cozumel: ½ mi. inland from waterfront, on outskirts of San Miguel; under coral rock and debris. 2 April 1960. E. L. Bousfield and F. R. Daiber, collectors.

Helicina (Succincta) arenicola Morelet, 8 specimens
Annularia (Choanopomops) cozumelensis (Richards), many
Lamellaxis micra (Orbigny), 2
Drymaeus cozumelensis Richards, 3
Orthalicus princeps (Broderip), 1 juvenile
Microceramus concisus (Morelet), 14
Streptostyla pilsbryi Richards, 11

Sta. 46. Isla de Cozumel: 2 mi. NE of San Miguel, beyond airfield, ¼ mi. E of road; under leaf mold in sink, 5 ft below road level. 8 April 1960. J. F. G. Clarke, collector.

Annularia (Choanopomops) cozumelensis (Richards), 2
Drymaeus cozumelensis Richards, 1
Praticolella griseola (Pfeiffer), 20

Sta. 55. Bahia de Ascension: ½ mi. N of Allen Point, north end of bay; shaken from palmetto fronds. 11 April 1960. J. F. G. Clarke, collector.

Helicina (Tristramia) bocourti Crosse & Fischer, many

Sta. 96. Bahia de Ascension: 300 yards SW of Suleiman Point, north end of bay; on underside of fallen palmetto fronds and on ground beneath. 19 April 1960. H. A. Rehder, collector.

Helicina (Tristramia) bocourti Crosse & Fischer, many

Sta. 98. Tulum: Under stones along base of ruins. 20 April 1960. H. A. Rehder and J. F. G. Clarke, collectors.

Annularia (Choanopomops) largillierti (Pfeiffer), many
Annularia (Choanopomops) cozumelensis (Richards), 3
Gastrocopta pellucida (Pfeiffer), 1
Gastrocopta servilis (Gould), 1
Succinea carmenensis Crosse & Fischer, 5
Microceramus concisus (Morelet), 1

Sta. 113. Isla de Cozumel: Same locality as Sta. 46. 23 April 1960. F. L. Daiber and J. F. G. Clarke, collectors.

Helicina (Succincta) arenicola Morelet,
Annularia (Choanopomops) cozumelensis (Richards), many
Lamellaxis martensi (Pfeiffer), 5
Lamellaxis (Allopeas) gracile (Hutton), 1
Orthalicus princeps (Broderip), 1
Praticolella griseola (Pfeiffer), 7

Sta. 116. Isla de Cozumel: ¼ mi. E of waterfront, San Miguel; in cleared and burned-over field, under and among coral rock and wood debris. 29 April 1960. H. A. Rehder, collector.

Helicina (Succincta) arenicola (Morelet), 3
Annularia (Choanopomops) cozumelensis (Richards), 3
Lamellaxis martensi (Pfeiffer), 2
Drymaeus cozumelensis Richards, 4
Streptostyla pilsbryi Richards, 2

Annotated List of Species

The following annotated list includes all the species known to occur within the boundaries of Quintana Roo. To assist future students of the fauna who may wish to use this list as a basis for their work, I have added under each species heading the original citation of the species, and, wherever possible, at least one other reference to a publication with a figure of the species. Unfortunately, many of the species are not described and figured in recent and readily available malacological works. In addition, I have given all references where mention is made of an occurrence of a species in Quintana Roo.

Family HELICINIDAE

Genus *HELICINA* Lamarck, 1799

Subgenus *SUCCINCTA* Wagner, 1905

Helicina (Succincta) arenicola Morelet, 1849

Helicina arenicola Morelet, 1849, p. 21.—Fischer & Crosse, 1893, p. 424–425, pl. 56, Figs. 8, 8a–c.—Wagner, 1910, p. 316, pl. 63, Figs. 11–13.—Richards, 1937, p. 257.

This species is fairly well distributed over much of the northern part of the Yucatán Peninsula. From Quintana Roo we have seen specimens from Chancanab, Lake Chichankanab near Esmeralda, and Tulum. We collected it at several places near San Miguel, Isla de Cozumel, and Richards records it also from San Gerbacio on the same island.

Subgenus *TRISTRAMIA* Crosse, 1862

Helicina (Tristramia) bocourti Crosse & Fischer, 1869

Figs. 8–10, 18–20

Helicina Bocourti Crosse & Fischer, 1869, p. 251.

Helicina Dysoni var. *Bocourti* Fischer & Crosse, 1893, p. 437–438, pl. 56, Fig. 10.

Helicina dysoni var. *jansoni* Martens, 1890, p. 40, pl. 1, Fig. 18.

This species, found by us in two localities at the northern end of Bahia de Ascension, has apparently not been recorded previously from north of Belize, British Honduras, the type-locality. I have examined specimens of this species, now in the collections of the Academy of Natural Sciences, Philadelphia, collected by R. Robertson, at various places along the coast of British Honduras, from Rocky Point, at the northern tip, to Port Honduras, near the Guatemala border.

The specimens of *Helicina dysoni* listed as occurring on Utilla Island, Honduras by Ancey (1886, pp. 255–256), and the variety *jansoni* Martens (1890, p. 40) from Bonacca Island, Honduras (now known as Isla Guanaja), listed by Richards (1938, p. 174) as occurring also on the neighboring Isla Roatan, should all be referred to *H. bocourti*.

Martens' separation of his variety *jansoni* on the basis of its being more angulate than *bocourti* is difficult to understand if one examines his figure of this variety, which shows a shell less angulate and flattened than Fischer and Crosse's figure of the typical form.

The geographic range of *H. bocourti*, therefore, extends from Bahia de Ascension, midway on the coast of Quintana Roo, along the coast of British Honduras, to Isla Guanaja, at the midpoint of the coast of Honduras.

H. B. Baker (1922, p. 47) was not sure that *bocourti* and *jansoni*, considered by Pfeiffer (1852, p. 384), Martens (1890, p. 40), and Fischer & Crosse (1893, p. 437) to be subspecies or varieties of *Helicina* *dysoni*, were related to *H. dysoni*. An examination of the radula of one of the specimens we collected (Figs. 18–19) shows that *H. dysoni* belongs in the subgenus *Tristramia*, of *Helicina*, rather than in the genus *Alcadia*, where many workers have placed it.

Helicina dysoni Pfeiffer (1849, p. 121), described originally from "Cumana, Honduras," was designated by H. B. Baker (1922, p. 47) as type of the section *Analcadia* A. J. Wagner, 1907. I have figured a syntype of *Helicina dysoni* (Figs. 11–13), bearing the BM (NH) Reg. no. 196283, that I here designate as the lectotype. This specimen closely matches specimens in the U. S. National Museum collection from the State of Sucre, Venezuela, and from the neighboring island of Margarita. The Venezuelan specimens show a rounded body whorl, not angulate as in *bocourti*, with the surface bearing periostracal hairs, and an operculum that shows the greater calcification characteristic of the genus *Alcadia*, as opposed to the largely horny, red-colored operculum, calcified only near the columellar edge, usually found in *Helicina*. For purposes of comparison I have figured specimens of *bocourti* from Bahia de Ascension (Figs. 8–10).

It is well known that Dyson collected in Venezuela as well as in Honduras (Hewitson, 1848, p. 117), and since *Alcadia dysoni* seems to be restricted to Venezuela and the neighboring islands, I assume that the locality cited in the original description is partly erroneous, and should read "Cumana, Venezuela."

Helicina diaphana Pfeiffer, described from Honduras, and listed by H. B. Baker (1922, p. 47) with some doubt as a subspecies of *dysoni*, is distinct from both *bocourti* and *dysoni*, according to a photograph of a syntype of *H. diaphana* in my possession. The figures for this species given by Sowerby (1866, pl. 275, Fig. 41; 1873, pl. 28, Fig. 251) show a shell that is too strongly angulated, a fact that undoubtedly led Baker to ally *diaphana* with *bocourti*.

From a comparison of the radular characters with those depicted by H. B. Baker (1922, pl. 3, 4), *Helicina bocourti* seems to belong in the subgenus *Tristramia*, but I am not certain that radular characters alone can be used for subgeneric differentiation. In the radula of *H. bocourti* (Fig. 18–19) the centrals have the characters of the *Oxyrhombus* group, while what Baker calls the capituliform complex appears to combine the characters of both *Oxyrhombus* and *Tristramia*, the comb-lateral being more like that found in *Oxyrhombus*, while the acessory plate resembles that in the radula of *Tristramia*. To clarify these comparisons I have copied (Figs. 14–17) the radula figures for *Tristramia* and *Oxyrhombus* groups from Baker (1922, pl. 3, Figs. 8, 9; pl. 4, Figs. 13, 15). Baker first (1922, pp. 48–51) placed *Oxyrhombus* and *Tristramia* as sections under *Helicina*, subgenus *Tristramia*, but later (1926, p. 42) recognized both of these groups as distinct subgenera. On the basis of the radular characters I synonymize *Oxyrhombus* and *Tristramia* and use the older name *Tristramia* as the subgenus for *bocourti*.

Family CYCLOPHORIDAE

Genus *Neocyclotus* Fischer & Crosse, 1886

Neocyclotus dysoni berendti (Pfeiffer, 1861)

Cyclotus (?) *Berendti* Pfeiffer, 1861, p. 171.
Neocyclotus Berendti Fischer & Crosse, 1886, p. 167, pl. 38, Figs. 4–5.
Poteria (Neocyclotus) berendti Bequaert & Clench, 1933, p. 540.
Aperostoma (Neocyclotus) dysoni berendti Bartsch & Morrison, 1942, p. 212, pl. 29, Figs. 4–6.

Four specimens collected 12 km from Icaiche by A. Dampf belong to this subspecies, which is not uncommon in the State of Yucatán.

Family PILIDAE

Genus *Pomacea* Perry, 1811

Pomacea flagellata (Say, 1829)

Ampullaria flagellata Say, 1829, p. 260.—Marten, 1899, p. 405, pl. 23, Figs. 1, 4, 4a–b.
Pomacea violacea Bequaert & Clench, 1933, p. 543.

This species has been divided into numerous subspecies and varieties by several authors, based largely on shape of shell and superficial sculpture and color. I have seen two lots of this species from Quintana Roo, one from Lake Chichancanab, in the northwest corner of the territory, and the other from 12 km from Icaiche, in the southwest corner. These lots show considerable variation in form and color, and cast some doubt on the validity of most of the named subspecies of this variable Mexican and Central American species.

Family POMATIASIDAE

Genus *Annularia* Schumacher, 1817

The name *Choanopoma* Pfeiffer, 1847 has been used for this genus by numerous writers for many years instead of the earlier name *Annularia*, because of doubts concerning the validity of Dall's type designation for *Annularia*. Dall (1905, p. 208) designated as type of Schumacher's genus *Turbo lincina* Linnaeus, a name that Schumacher cited as synonym of his species *Annularia fimbriata*; in addition, he referred to a figure of *Turbo lincina* in Chemnitz (1786, pl. 123, Fig. 1060).

The claim that the *Turbo lincina* in Schumacher is not *Turbo lincina* Linnaeus and that, therefore, the type designation is not valid is irrelevant, for Linnaeus' species as a synonym is available as a type-species, regardless of Schumacher's concept of that species.

Aguayo (1934, p. 135) has shown that *Turbo lincina* Linnaeus, the type-species of both *Annularia* and *Choanopoma*, can be identified with a Jamaican species.

The use of *Annularia*, as exemplified by Wenz (1939, p. 548) should be followed if we are to adhere to the International Code of Zoological Nomenclature.

Subgenus *Choanopomops* H. B. Baker, 1928

Annularia (Choanopomops) largillierti (Pfeiffer, 1846)

Cyclostoma Largillierti Pfeiffer, 1846B, p. 46.
Cistula Largillierti Fischer & Crosse, 1890, p. 196, pl. 42, Figs. 10, 10a–b.
Choanopoma (Choanopomops) largellierti Solem, 1961, p. 200, pl. 12, Figs. 24j–k.

The abundant presence of this species around the base of some of the crumbling buildings of the ruins of Tulum, on the mainland, almost opposite the southern end of Isla de Cozumel, makes it appear likely that it may be found elsewhere along this coast, and thus tie together the Yucatán records of this species with that of Chetumal (Solem, 1961, p. 200) near the border of British Honduras.

Annularia (Choanopomops) cozumelensis (Richards, 1937)

Choanopoma cozumelensis Richards, 1937, p. 256, pl. 4, Fig. 3.
Choanopoma (Choanopomops) cozumelensis Solem, 1961, p. 198, pl. 10, Fig. 7; pl. 12, Fig. 24g.

According to Solem this species is known only from Isla de Cozumel, where we collected it in several places. However, I also found three specimens at Tulum, among specimens of the more common *A. largillierti* (Pfeiffer). *A. cozumelensis*, therefore, like *largillierti*, may be found to occur elsewhere along the coast.

Family PHYSIDAE

Genus *Stenophysa* Martens, 1898

Martens (1898, p. 362) proposed *Stenophysa* as a subgenus of *Physa*, including in it a number of species that Fischer & Crosse (1886, pp. 85–95) had placed in the genus *Aplexa*, whose type-species is the boreal *A. hypnorum* Linnaeus. The type-species of Martens' new subgenus, the West Indian *Physa sowerbyana* (= *Stenophysa rivalis* Maton & Rackett), agrees with *S. spiculata* in having the right, or columellar, margin of the mantle edge scalloped and furnished with pigment spots. The other Mexican and Middle American species that resemble *S. spiculata* in shell characters were distributed by Martens (*l.c.*) among the subgenera *Aplexa* and *Stenophysa* depending on the color and form of the shell, and the nature of the columellar margin of the aperture. These shell characters are in my opinion too plastic and variable to be used to differentiate these two taxa, and until the mantle character of each of these neotropical species is examined, I believe that they should all be assigned to *Stenophysa*. I am raising *Stenophysa* to generic rank on the basis of the character of the mantle edges and because of the distinct geographic areas inhabited by it and *Aplexa*.

Stenophysa spiculata (Morelet, 1849)

Physa spiculata Morelet, 1849, p. 18.
Physa cisternina Morelet, 1851, p. 15.
Aplecta spiculata Fischer & Crosse, 1886, p. 93, pl. 27, Figs. 13–13b.
Aplexa spiculata Bequaert & Clench, 1936, pp. 69–70, pl. 2, Figs. 1–4.—Richards, 1937, p. 256.

This species inhabits Campeche, Yucatán, Quintana Roo, British Honduras, and northern Guatemala.

Stenophysa princeps (Phillips, 1846)

Physa princeps Phillips, 1846, p. 66–67, pl. 1, Fig. 11 .
Aplexa princeps Bequaert & Clench, 1936, p. 68, pl. 1, Figs. 5–6.
?*Aplexa maugeriae* Bequaert & Clench, 1936, p. 69.

The geographic range of this species, recorded by Bequaert and Clench (1933, p. 539; 1936, pp. 68–69) from Yucatán and from the Rio Hondo, on the boundary between Quintana Roo and British Honduras, extends apparently from the state of Tabasco, Mexico, to northern Guatemala. A lot collected at Puerto Morelos, Quintana Roo, by Nelson and Goodman, consists of specimens varying considerably in shape of shell and aperture and in form of the columella. Because of this variability the specimens from Tabasco, Yucatán, and northern Guatemala, identified by Bequaert and Clench (1936, p. 69) as *Aplexa maugeriae* (Sowerby), are probably this species.

Family PLANORBIDAE

Genus *DREPANOTREMA* Crosse & Fischer, 1880

Subgenus *FOSSULORBIS* Pilsbry, 1934

Drepanotrema (Fossulorbis) kermatoides (Orbigny, 1835)

Planorbis kermatoides Orbigny, 1835, p. 27.
Planorbis cultratus Orbigny, 1841, p. 196, pl. 14, Figs. 5–8.
Drepanotrema cultratum Richards, 1937, p. 255.

This species was found by Richards in association with the other three species of this family on the Isla de Cozumel.

Subgenus *ANTILLORBIS* Harry & Hubendick, 1964

Drepanotrema (Antillorbis) aeruginosus (Morelet, 1851)

Planorbis aeruginosus Morelet, 1851, p. 15.
Planorbis circumlineatus Shuttleworth, 1854, p. 96–97.
Gyraulus arizonensis Richards, 1937, p. 255 (not Pilsbry & Ferris, 1915).—Branson, 1963, p. 51–52 (in part).

Two lots of this species, collected by H. G. Richards on Isla de Cozumel, were identified by him as *Gyraulus arizonensis* Pilsbry and Ferris. As the presence of a Sonoran species in the coastal area of Yucatán seemed an anomaly, I requested the loan of this material. J. P. E. Morrison identified Richards' specimens as *D. aeruginosa.* The nomenclature and distribution of *D. aeruginosa* is discussed by Harry and Hubendick (1964, pp. 32–33).

Genus *Armigerus* Clessin, 1884

A strict interpretation of the International Code of Zoological Nomenclature forces us to follow Morrison (1947, p. 30–31) in his use of this name. The divergent views of H. J. Walter (1963, p. 92) and C. A. Wright (1962, p. 39; 1963, p. 98) on the morphology of this and allied genera, seems to point to the need for further anatomical work. Until this is forthcoming, I am inclined to consider this genus as distinct from *Taphius.*

Armigerus obstructus (Morelet, 1849)

Planorbis obstructus Morelet, 1849, p. 17.

Planorbula obstructa Fischer & Crosse, 1880, p. 78, pl. 33, Figs. 8–8d; pl. 34, Figs. 7–7d.—Richards, 1937, p. 255.

Tropicorbis (Obstructio) obstructus F. C. Baker, 1945, p. 85, pl. 128, Figs. 26–33; pl. 133, Figs. 28–35.

This rather widely spread species was recorded by Richards as occurring in a dried swamp, a short distance north of San Miguel, Isla de Cozumel.

Subgenus *Tropicorbis* Pilsbry & Brown, 1914

Armigerus (Tropicorbis) orbiculus (Morelet, 1849)

Planorbis orbiculus Morelet, 1849, p. 17.—Fischer & Crosse, 1880, p. 70, pl. 32, Figs. 9–9c.—Richards, 1937, p. 255.

Tropicorbis orbiculus F. C. Baker, 1945, p. 85, pl. 129, Figs. 1–3, 5–7, 10–16.

Richards found this species in dried swamps north of San Miguel, and near San Gerbacio, Isla de Cozumel.

Family GASTROCOPTIDAE

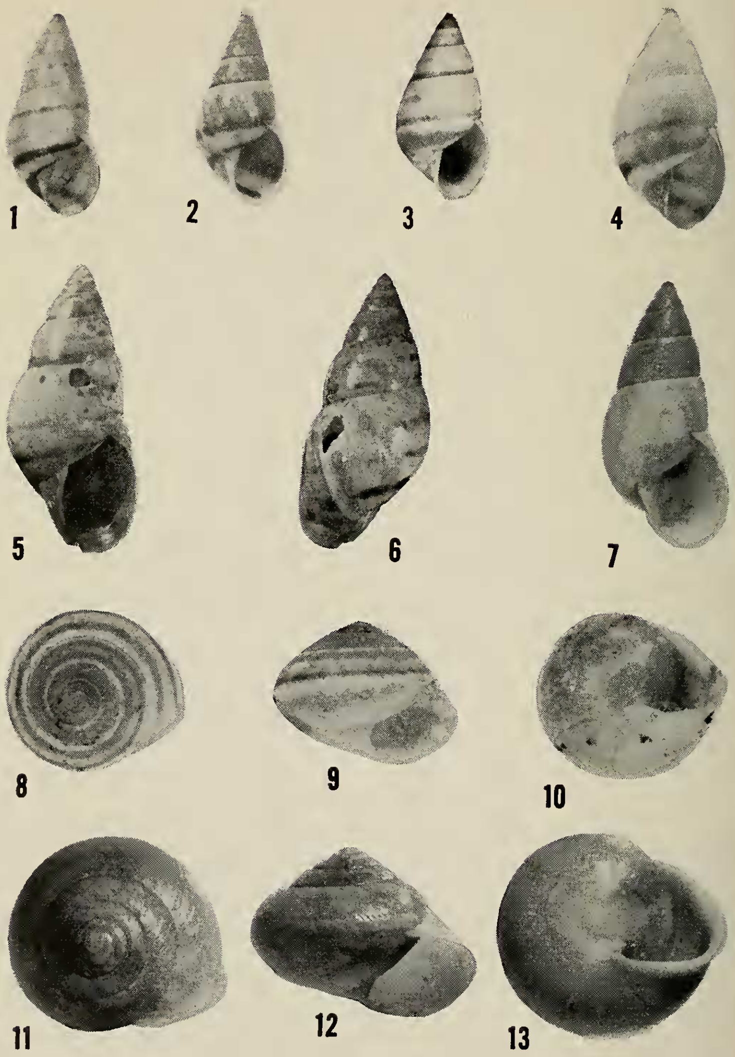
This family name replaces Chondrinidae as used by Zilch (1959, p. 156) and Taylor and Sohl (1962, p. 11), since the generic name *Chondrina* Reichenbach, 1828 on which the family name is based, is a synonym of *Chondrus* Cuvier, 1817, a member of the family Enidae. *Chondrina* was proposed as a substitute for *Chondrus* Cuvier, erroneously believed to be preoccupied by *Chondrus* Stackhouse, 1797, a genus of algae. *Chondrina,* therefore, has the same type-species as *Chondrus* Cuvier, and becomes a synonym. *Chondrina s.l.* of authors becomes *Modicella* H. & A. Adams, 1855, and the restricted *Chondrina* of authors is replaced by *Alloglossa* Lindström, 1868.

Gastrocoptidae is, furthermore, the oldest family name for this group, having been used by Pilsbry in 1918 as a subfamily.

Genus *Gastrocopta* Wollaston, 1878

Gastrocopta pellucida (Pfeiffer, 1841)

Pupa pellucida Pfeiffer, 1841, p. 466.



FIGS. 1–13. 1, *Drymaeus shattucki* Bequaert & Clench, holotype. 2, *Drymaeus* sp., (Progreso, Yucatan), 3–4, *D. mayaorum* Rehder, 3, paratype; 4, holotype. 5–6, *D. hondurasanus* (Pfeiffer). 7, *D. cozumelensis* Richards. 8–10, *Helicina bocourti* Crosse & Fischer. 11–13, *Alcadia dysoni* (Pfeiffer).

Gastrocopta pellucida Pilsbry, 1916, p. 75, pl. 15, Figs. 1–3, 5.

This species has been recorded from Yucatán by Fischer & Crosse (1873, p. 312) and Harry (1950, p. 22). Because these workers considered *G. servilis* (Gould) to be a synonym of *pellucida* their records cannot be definitely assigned to either species. This and the following species are rare in Yucatan as Bequaert and Clench (1933; 1936; 1938) did not find them among the collections from Yucatán submitted to them. We found only one specimen at Tulum.

Gastrocopta servilis (Gould, 1843)

Pupa servilis Gould, 1843, p. 356, pl. 16, Fig. 14.
Gastrocopta servilis Pilsbry, 1916, p. 70.

This species is much more widely spread than the preceding one, and its occurrence in Quintano Roo is not unexpected in view of its having been recorded from the states of Vera Cruz, Campeche, and Yucatán, in Mexico, and from northern Guatemala and Panama. We found only one specimen at Tulum.

Family SUCCINEIDAE

Genus *Succinea* Draparnaud, 1801

Succinea carmenensis Fischer & Crosse, 1878

Succinea undulata var. *carmenensis* Fischer & Crosse, 1878, p. 657, pl. 27, Figs. 6, 6a.
Succinea carmenensis Richards, 1937, p. 255, pl. 4, Fig. 5.

This species, originally described from Isla del Carmen, Campeche, was found by Richards on the Isla de Cozumel, and by us about the ruins of Tulum on the mainland. In addition, a specimen collected on the Isla de Cozumel on 29 January 1885 by the U. S. Fish Commission is in the U. S. National Museum collection. Bequaert and Clench (1933, p. 537) record *S. carmenensis* from several intermediate localities in Yucatán.

Family SUBULINIDAE

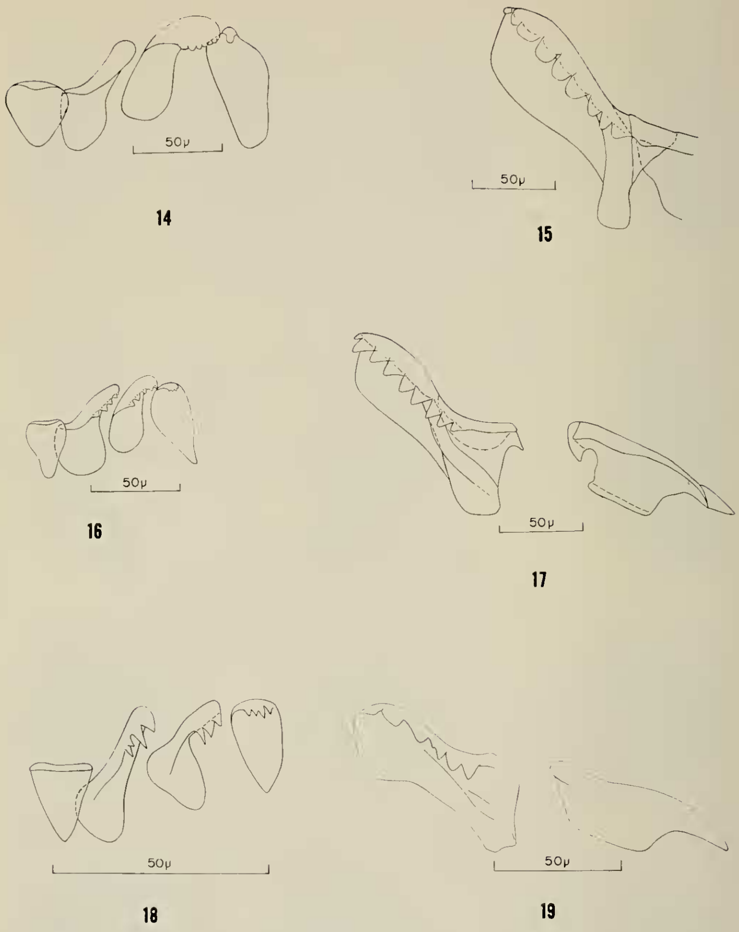
Genus *Lamellaxis* Strebel & Pfeiffer, 1882

Subgenus *Lamellaxis* s.s.

Lamellaxis (Lamellaxis) martensi Pfeiffer, 1856

Bulimus Martensi Pfeiffer, 1856, p. 318.
Spiraxis Martensi Fischer & Crosse, 1877, p. 619, pl. 25, Figs. 9, 9b.
Leptinaria martensi Pilsbry, 1907, p. 308, pl. 41, Fig. 68.
Lamilaxis [sic] martensi Richards, 1937, p. 254, pl. 4, Fig. 1.

This species, recorded by Richards from near San Miguel and San Gerbacio on the Isla de Cozumel, was found by us also at the former locality.



FIGS. 14–19. 14, *Helicina (Tristramia) zephyrina* Duclos. Central complex of radula; rachidian and A, B, and C centrals (after Baker, 1926). 15, *Helicina (Tristramia) zephyrina* Duclos. Capituliform complex of radula: comb-lateral and inner end of accessory plate (after Baker, 1926). 16, *Helicina (Oxyrhombus) amoena* Pfr. Central complex (as in Fig. 14) (after Baker, 1926). 17, *Helicina* (*Oxyrhombus*) *amoena* Pfr. capituliform complex: comb-lateral and accessory plate (after Baker, 1926). 18, *Helicina (Oxyrhombus) bocourti* Cr. & Fischer. Central complex. 19, *Helicina (Oxyrhombus) bocourti* Cr. & Fischer. Capituliform complex.

Lamellaxis (Lamellaxis) micra (Orbigny, 1835)

Helix micra Orbigny, 1835, p. 9.
Bulimus micra Orbigny, 1837, p. 262, pl. 41, Figs. 18–20.
Opeas costatostriatus Fischer & Crosse, 1877, p. 598, pl. 26, Figs. 5–5b. not *costatostriatus* Pfeiffer, 1856).
Opeas octonoides Martens, 1898, p. 293, pl. 17, Fig. 9.
Opeas micra Pilsbry, 1906, p. 193, pl. 27, Figs. 49, 56–57.
Lamilaxis [sic] micra Richards, 1937, p. 254.

This species, widely distributed throughout tropical America, was found near San Miguel, Isla de Cozumel, both by Richards and during the Bredin–Smithsonian Institution Expedition.

Subgenus *Allopeas* H. B. Baker, 1935

Lamellaxis (Allopeas) gracilis (Hutton, 1834)

Bulimus gracilis Hutton, 1834, p. 93.
Opeas gracile Pilsbry, 1906, p. 125, pl. 18, Figs. 3–6.
Lamellaxis (Allopeas) gracilis Baker, 1945, p. 88.

One specimen of this species, widely spread in the tropical parts of the world, was found near San Miguel, Isla de Cozumel.

Family BULIMULIDAE

Genus *Bulimulus* Leach, 1814

Bulimulus sanmiguelensis Richards, 1937

Bulimulus sanmiguelensis Richards, 1937, p. 253, pl. 4, Fig. 6.

This species, found by Richards in some numbers near San Miguel, Isla de Cozumel, was not collected by us. In shape of shell it is closer to *Bulimulus dysoni* (Pfeiffer), described from Honduras, than to *B. unicolor* (Sowerby), to which Richards compared it.

Genus *Drymaeus* Albers, 1850

Drymaeus cozumelensis Richards, 1937

Fig. 7

Drymaeus cozumelensis Richards, 1937, p. 253, pl. 4, Fig. 4.
Drymaeus serperastrus Branson and McCoy, 1963, p. 106 (in part).

The examination of a large series of specimens of this species and of *Drymaeus shattucki* Bequaert and Clench, has led me to the conclusion that *D. cozumelensis* is a distinct species rather than a subspecies of *shattucki*, as Richards considered it. Branson and McCoy (1963, p. 106) are also inclined toward this view.

D. cozumelensis is generally larger than *D. shattucki*, with an outer lip that is noticeably expanded and with the inner lip rather broadly reflected over the moderately wide umbilicus. The color is usually pure white with apex and umbilical area pinkish brown to coral pink, and the columellar portion of the lip is also tinted but usually more faintly.

Some specimens show banding, the pattern consisting of five interrupted bands of varying width, similar to that found in *D. shattucki.* Two out of five specimens collected by C. J. McCoy 3 km S of San Miguel and kindly loaned to me by him show this distinct banding. These are the specimens that were called *D. serperastrus* by Branson and McCoy (1963, p. 106). Some specimens have the last whorl of a straw-yellow color, with the yellow color apparent also within the aperture. The species is apparently restricted to the Isla de Cozumel.

Drymaeus shattucki (Fig. 1) is smaller than *cozumelensis,* with the outer lip unexpanded, and the inner lip fairly narrowly reflected over the smaller unbilicus. The specimens vary in color from pure white to possessing four bands as in the holotype figured here. The inner lip is always uncolored and the apex is usually without color, although in the holotype it is light straw-colored, and in this respect exactly like the nuclear whorls of the holotype of *D. cozumelensis. Drymaeus shattucki* is found from Oxkutzcab and Chichén Itzá in Yucatán south into the Petén district of northern Guatemala (Goodrich and van der Schalie, 1937, p. 28).

The specimen from Progreso, Yucatan, mentioned by Bequaert and Clench (1933, p. 533), and which I have figured (Fig. 2), seems to represent another species, as it is without the microscopic spiral grooves found in all the other shells, has a noticeably expanded lip, and has only two bands—peripheral and subperipheral. I hesitate to describe this as a new species on the basis of only one specimen, well-marked as it may be. Further collecting needs to be done in the region about Progreso and the coastal area of Yucatán.

We found *D. cozumelensis* in several places near San Miguel, Isla de Cozumel. Two of the specimens show the yellow coloration mentioned by Richards in his original description.

Drymaeus hondurasanus (Pfeiffer, 1846)

Figs. 5–6

Bulimus Hondurasanus Pfeiffer, 1846, p. 29.
Drymaeus hondurasanus Pilsbry, 1899, p. 88, pl. 15, Fig. 41.

Because Bequaert and Clench (1933, p. 533) suggest that *D. shattucki* may be referable to *D. hondurasanus,* a species that is not known to occur in Quintana Roo, I obtained a photograph, which I reproduce here, of a specimen labeled as a syntype of *Drymaeus hondurasanus* (Pfeiffer) and which I am here designating as the lectotype of this species. This specimen, collected on the leaves of bushes by Dyson, measures 28.5 mm high and 13 mm wide, considerably greater than the dimensions given by Pfeiffer in his original description.

It is obviously quite different from *D. shattucki,* and also does not appear to be related to *D. alternans* Beck, as Martens suggested (1890–91, p. 232). The terrestrial mollusks of Honduras are very poorly known, and this species may be rediscovered there.

Drymaeus mayaorum, new species

Figs. 3–4

Dymaeus shattucki Richards, 1937, p. 253 (not *shattucki* Bequaert & Clench, 1933).

Diagnosis: Shell rather broadly elongate-conic, white with bands of isabelline or buffy brown which may have irregular, interrupted spots of darker brown. Apical whorls dark-colored and umbilical area straw-colored. Lip thin, simple at the columella, strongly and narrowly reflected over the narrow umbilicus.

Range: Isla Mujeres and Isla de Cozumel, off the coast of Quintana Roo, Mexico.

Description: Shell moderately broadly elongate conic, 19.8–23.3 mm in height, narrowly umbilicate, moderately thin; 6½ whorls, only slightly convex, suture moderately impressed. Color white, with four bands of isabelline and buffy brown on the last whorl, the peripheral band and the one midway between the periphery and the suture narrow, the one between the periphery and the umbilicus, and the one spotting the umbilical area broader; in the holotype the uppermost band is obscure and the peripheral and subperipheral bands are irregularly marked with splotches of darker chestnut brown. The apex is dark-colored. The sculpture consists of very fine, rather wavy and fairly crowded, incised lines, with the nuclear whorls showing the typical *Drymaeus* grated sculpture. Aperture moderately broadly oval, with the outer lip simple, and the inner, columellar lip narrowly reflected over the umbilicus.

Holotype (U.S.N.M. 251656): Isla Mujeres, Quintana Roo, Mexico, collected by E. W. Nelson and E. A. Goldman, 25 March 1901 (Fig. 4). Measurements: height, 23.3 mm; width, 12.0 mm.

Paratype (A.N.S.P. 167664): Near San Miguel, Isla de Cozumel, Quintana Roo, Mexico, collected by H. G. Richards, 1936 (Fig. 3). Measurements: height, 19.8 mm; width, 10.0 mm.

Remarks: This species differs from *D. cozumelensis* Richards in being smaller, more conic, conspicuously banded, with an unexpanded outer lip. From *D. shattucki* Bequaert and Clench it differs in being broader, more conical, with tinted nucleus and umbilical area, and with a broader aperture. The color pattern resembles that of some of the forms of *D. emeus* (Say) but that species is more elongate-ovate in outline and not as broadly conic as is *D. mayaorum*.

The paratype is the specimen that Richards (1937, p. 253) identified as *Drymaeus shattucki*, to which species *D. mayaorum* is probably most closely related.

Family ORTHALICIDAE

Genus *Orthalicus* Beck, 1837

Orthalicus princeps (Sowerby, 1833)

Bulinus princeps 'Broderip' Sowerby, 1833, pl. 27, Fig. 18, p. 6.

Orthalicus princeps Fischer & Crosse, p. 455, pl. 18, Figs. 2, 2a.
Ortalicus princeps Martens, 1893, p. 182, pl. 10, Figs. 3–6.
Oxystyla princeps Pilsbry, 1899, p. 113, pl. 16, Figs. 1–9.—Richards, 1937, p. 253.

Two freshly dead specimens of this species were found on the eastern outskirts of San Miguel, Isla de Cozumel, and two miles NE of that town. Richards found several dead shells near the beach on the west side of the island, and McCoy collected living specimens on fig trees south of San Miguel (Branson and McCoy, 1963, p. 107).

Family UROCOPTIDAE

Genus *Brachypodella* Beck, 1837

Brachypodella speluncae (Pfeiffer, 1852)

Cylindrella speluncae Pfeiffer, 1852, p. 151.—Fischer & Crosse, 1873, p. 410, pl. 17, Figs. 11–11b.
Brachypodella speluncae Pilsbry, 1903, p. 69, pl. 6, Figs. 13–14, 17–18. —Richards, 1937, p. 254.

This species, of which Richards found specimens in two localities on Isla de Cozumel, is found on the mainland in Yucatán and northern Guatemala.

Genus *Microceramus* Pilsbry & Vanatta, 1898

Microceramus concisus (Morelet, 1849)

Cylindrella concisa Morelet, 1849, p. 12.
Macroceramus concisus Fischer & Crosse, 1873, p. 421, pl. 18, Figs. 1–1b.
Microceramus concisus Pilsbry, 1904, p. 155, pl. 25, Figs. 7–12.—Richards, 1937, p. 254.

This species, with a range similar to that of the preceding species, was found also in two localities on Isla de Cozumel by Richards. In 1960 we found it on the outskirts of San Miguel, Isla de Cozumel, and also at the ruins of Tulum on the mainland.

Family EUCONULIDAE

Genus *Guppya* Mörch, 1867

Guppya gundlachi (Pfeiffer, 1840)

Helix gundlachi Pfeiffer, 1840, p. 250.
Guppya gundlachi Richards, 1937, p. 252.—Pilsbry, 1946, p. 244, Fig. 120.

This widely distributed species, ranging from Florida and Texas to Venezuela and Trinidad and throughout the West Indies, was collected near San Miguel, Isla de Cozumel.

Family THYSANOPHORIDAE

Genus *Thysanophora* Strebel & Pfeiffer, 1880

Subgenus *Lyroconus* H. B. Baker, 1927

Thysanophora (Lyroconus) plagioptycha (Shuttleworth, 1854)

Helix plagioptycha Shuttleworth, 1854, p. 37.
Thysanophora plagioptycha Richards, 1937, p. 252.
Thysanophora (Lyroconus) plagioptycha Pilsbry, 1940, p. 989, Fig. 576.

This species, found in the West Indies and from eastern Mexico to Trinidad and Venezuela, was found near San Miguel, Isla de Cozumel, by Richards.

Thysanophora (Lyroconus) caecoides (Tate, 1870)

Helix caecoides Tate, 1870, p. 155, pl. 16, Fig. 2.
Thysanophora caecoides Pilsbry, 1920, p. 95–96, Fig. 4.—Richards, 1937, p. 252.

Richards found this species, whose range extends from Vera Cruz, Mexico, to Panama, with the preceding species on Isla de Cozumel.

Family POLYGYRIDAE

Genus *Polygyra* Say, 1818

Polygyra cereolus (Muhlfeld), form *carpenteriana* (Bland, 1860)
Helix Carpenteriana Bland, 1860, p. 138.
Polygyra cereolus carpenteriana Bequaert & Clench, 1933, p. 531.
Polygyra cereolus form *carpenteriana* Pilsbry, 1940, p. 585, Figs. 379i–k.

Bequaert and Clench record this form from Progreso, Yucatán, and Puerto Morelos, Quintana Roo. It has been collected on Isla Mujeres by Nelson and Goldman, who also gathered the specimens from Puerto Morelos. I have examined both of these lots, and although Bartsch had separated them specifically in manuscript, I cannot distinguish them from Floridan specimens.

Subgenus *Erymodon* Pilsbry, 1956

Polygyra (Erymodon) yucatanea (Morelet, 1849)

Helix yucatanea Morelet, 1849, p. 9.
Helix (Polygyra) Yucatanea Fischer & Crosse, 1872, p. 277, pl. 12, Figs. 14, 14a.
Polygyra yucatanea Bequaert & Clench, 1933, p. 531.

This species, originally described from specimens from the Isla del Carmen in Campeche and from the State of Tabasco, is found in the area stretching across the base of the Yucatán peninsula. Bequaert and Clench record it from San Juan Bautista (now known as Villahermosa) in Tabasco, and from Icaiche in the southwestern corner of Quintana Roo; in between it is not rare in the Petén district of Guatemala (Goodrich and van der Schalie, 1937, p. 27).

Genus *Praticolella* Martens, 1892

Praticolella griseola (Pfeiffer, 1841)

Fig. 20

Helix griseola Pfeiffer, 1841, p. 41.

Helix (Praticolella) berlanderiana var. *griseola* Martens, 1892, p. 140, pl. 7, Figs. 15–17.

Praticolella griseola Pilsbry, 1940, p. 690, Fig. 425.

The specimens from Isla de Cozumel resemble those from Campeche and Chichén Itzá, Yucatán. They differ from those found in the state of Vera Cruz in having a more flattened shape, with the whorls of the spire more convex, and with a wider umbilicus. In addition, an axially oriented pattern of irregularly alternating white opaque and darker translucent patches noticeably dominates the spiral bands which are more strongly marked in the specimens from Vera Cruz.

In an attempt to elucidate the status of the populations of *P. griseola*, a distributional map (Fig. 20) has been made of the specimens of the two common species of *Praticolella, berlandieriana* (Moricand) and *griseola* (Pfeiffer), that I have examined. This map is based on the specimens in the collection of the U. S. National Museum, and on reliable references in the literature. Though examination of specimens in other collections may alter somewhat the distributional pattern presented in this map, nevertheless several interesting facts are indicated.

One is that *P. griseola* and *berlandieriana* inhabit, with one exception, non-overlapping territories, that approach each other at only one point. The exception is the rather distinct Brownsville, Texas, population of *griseola* that lives well within the territory of *P. berlandieriana.*

The other fact is that *P. griseola* consists of a number of more or less well-characterized races. One is the Brownsville, Texas race, composed of rather large specimens with sharply defined color bands. The Yucatán race has already been briefly described above. I have seen no specimens of the race from the Lake Petén area in Guatemala (Goodrich & van der Schalie, 1937, p. 27), and am unable to determine whether it resembles the Yucatán race, or whether the shells have a distinct aspect. The Nicaraguan specimens from Isla Omotepe in Lake Nicaragua are generally thin-shelled, usually somewhat smaller and more elevated than the Mexican specimens, darker in color, and with no bands on the base, except occasionally a band in the umbilical area. The specimens from Momotombo, on the northern end of Lake Managua, are large, also thin, with the spiral coloration reduced or absent, giving them a dark, fragile appearance.

An interesting problem awaits the student of neotropical land snails who will undertake a study of the genus *Praticolella*. Further collecting in the intervening areas between the territories of the races as shown on the map may uncover new records. A careful study of large series of shells, and an examination of the soft parts of specimens of the various races should reveal whether these races are deserving of subspecific rank, parallel to the several Texan races of *P. berlandieriana.*

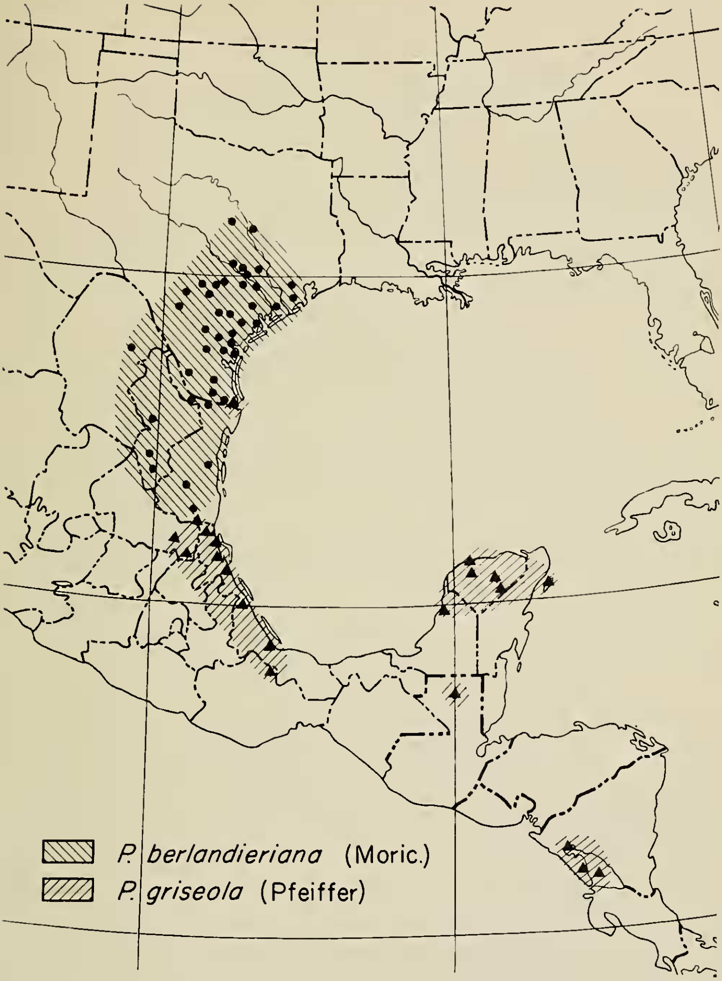


FIG. 20. Map showing distribution of *Praticolella berlandieriana* and *P. griseola* in Texas, Mexico and Central America.

Family OLEACINIDAE

Genus STREPTOSTYLA Shuttleworth, 1852

Streptostyla pilsbryi Richards, 1937

Streptostyla pilsbryi Richards, 1937, p. 252, pl. 4, Fig. 2.

This species, described by Richards from near San Gerbacio, Isla de Cozumel, was found by us in some numbers near San Miguel. Known only from Isla de Cozumel, it is related to S. *meridana* (Morelet, 1849) and *ventrosula* (Morelet, 1849, from Yucatán).

Genus *EUGLANDINA* Fischer & Crosse, 1870

Euglandina cylindracea (Phillips, 1846)

Glandina (Achatina) cylindracea Phillips, 1846, p. 67, pl. 1, Fig. 33.
Oleacina cylindracea Tryon, 1885, p. 41, pl. 8, Fig. 12.
Euglandina cylindracea Pilsbry, 1908, p. 198.—Richards, 1937, p. 251.

One broken specimen of this common Yucatán species was found by Richards near San Miguel, Isla de Cozumel.

Family HELMINTHOGLYPTIDAE

Genus *AVERELLIA* Ancey, 1887

Subgenus *TRICHODISCINA* Martens, 1892

Averellia (Trichodiscina) coactiliata (Deshayes, 1839)

Helix coactiliata Deshayes, 1839, p. 18, pl. 72, Figs. 1–5.
Helix (Patula) coactiliata Fischer & Crosse, 1872, p. 234 (exc. var.).
Averelia [sic] (Trichodiscina) coactiliata Richards, 1937, p. 252.

This species, found from Vera Cruz, Mexico, to Venezuela, was collected by Richards a short distance north of San Miguel, Isla de Cozumel.

ERRONEOUSLY REPORTED FROM QUINTANA ROO

Family UROCOPTIDAE

Genus *HOLOSPIRA* von Martens, 1860

Subgenus *HAPLOCION* Pilsbry, 1902

Holospira (Haplocion) yucatanensis Bartsch, 1906

Holospira (Liostemma) yucatanensis Bartsch, 1906, p. 153, pl. 3, Fig. 2. —Bequaert & Clench, 1938, p. 257.
Haplocion yucatanensis Drake, 1952, p. 131.—Pilsbry, 1952, p. 69.

This species was described by Bartsch from two specimens supposedly collected on Isla Mujeres by E. W. Nelson and E. A. Goldman. The true locality of this species, as pointed out by R. J. Drake (1952, pp. 131–132), is around Boquillas, northern Coahuila, and the adjacent parts of southern Texas (Pilsbry, 1952, pp. 69–70).

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